

## CLAIMS

What is claimed is:

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- Suba
1. A sensor cartridge for a fluid analyte analyzer, including
    - (a) a sensor assembly, including:
      - (1) a substrate;
      - (2) a plurality of sensors deposited on a first side of the substrate;
      - (3) a plurality of electrical conductors deposited on a second side of the substrate;
      - (4) a plurality of subminiature thru-holes filled with electrically conductive material, each thru-hole coupling one of the sensors with one of the electrical conductors;
      - (5) an electrical connector disposed on the second side of the substrate, the connector having a plurality of electrical contacts, at least some of the electrical contacts corresponding one to one with an associated one of the electrical conductors and at least some of the electrical contacts being coupled to the associated one of the electrical conductors; and
    - (b) an encasement into which the sensor assembly is placed for directing the flow of the analyte over the sensors, and preventing contact of the analyte with the second side of the substrate, including:
      - (1) an inlet for allowing the fluid analyte to enter the encasement;
      - (2) an outlet for allowing the fluid analyte to exit the encasement;
      - (3) a flow channel between the inlet and the outlet for allowing the fluid analyte to pass through the housing and over each of the sensors; and
      - (4) an opening at one side for exposing the electrical connector.

- 1 2. The sensor cartridge of claim 1, wherein the electrical connector is a surface

2 mount connector.

1 3. The sensor cartridge of claim 1, wherein the encasement further includes a reference  
2 cell.

1 4. The sensor cartridge of claim 3, wherein the reference cell is filled with a reference  
2 gel.

1 5. The sensor cartridge of claim 4, wherein the reference gel has a greater viscosity  
2 in a range of about 18-25 °C than at about 37° - 50° C.

1 6. The sensor cartridge of claim 3, further including a third cell disposed symmetrically  
2 about the flowcell with respect to the reference cell.

1 7. The sensor cartridge of claim 1, wherein the flowcell has a total volume of  
2 approximately 0.05 milliliters.

1 8. The sensor cartridge of claim 1, wherein the flowcell has a height of less than  
2 approximately 0.10 inches.

1 9. The sensor cartridge of claim 1, wherein the encasement is formed of composition  
2 of acrylic, styrene, and butadine.

1 10. The sensor cartridge of claim 1, wherein the outside dimensions of the encasement  
2 are less than 0.5 inches by 2.0 inches by 0.25 inches.

1 11. 13. The sensor cartridge of claim 1, wherein the sensor assembly is secured within  
2 the encasement by an adhesive.

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12. The sensor cartridge of claim 3, further including a reference channel between the reference cell and the flowcell.

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13. The sensor cartridge of claim 12, wherein the reference channel is less than approximately 0.010 inches in diameter.

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14. The sensor cartridge of claim 1, wherein:  
(a) the plurality of sensors includes an oxygen sensor; and  
(b) the flowcell includes a dome which increases the volume of the flowcell locally about the oxygen sensor.

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15. The sensor cartridge of claim 14, wherein the oxygen sensor is a amperometric cell.

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16. The sensor cartridge of claim 1, wherein the plurality of sensors include:  
(a) a sodium sensor;  
(b) a potassium sensor  
(c) a calcium sensor  
(d) a pH sensor  
(e) a carbon dioxide sensor  
(f) an oxygen sensor; and  
(g) a hematocrit value sensor.

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17. The sensor cartridge of claim 16, wherein the sodium sensor, potassium sensor, calcium sensor, and carbon dioxide sensor are each ion sensitive sensors.

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18. An apparatus having a preconditioned sensor and electronic circuit, comprising:  
(a) a nonconducting substrate with at least one electrochemical sensor and with electrical circuitry in electrical contact with the sensor to convey

electrical impulses from the sensor

- (b) a housing having at least one part enclosing the non conducting substrate and forming a channel in fluid contact with the at least one sensor on the substrate, wherein the channel has two openings formed in the housing for fluid flow through the channel and that is in fluid contact with the at least one sensor on the substrate to allow fluid in the channel to be in fluid contact with the sensor where

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